PATENT CLAIMS

1. A method for the removal of copper from a concentrated chloride-containing zinc sulphate solution known as raw solution that is going to an electrolytic preparation of zinc, using an ion exchanger or other selective separation material, **characterised in that** at least some of the raw solution is routed to copper removal, which takes place using a silica-based ion exchanger or other selective solid separation material, of which the functional group is a polymeric amine, and that the solution from which the copper has been removed is routed to the next stage of solution purification.

2. A method according to claim 1, **characterised in that** the ion exchanger or selective separation material is chelating and has an alkyl-silylated silica base.

3. A method according to claims 1 or 2, **characterised in that** the ion exchange stage comprises an alkaline pretreatment of the ion exchanger or other selective separation material, treatment with copper-free zinc sulphate solution, the copper removal, regeneration of the ion exchanger and separation of copper from the regeneration solution.

4. A method according to claim 1, **characterised in that** the zinc content of the raw solution is in the range of 30 - 200 g/l.

5. A method according to claim 1, **characterised in that** the copper content of the raw solution routed to copper removal is in the range of 100 – 2000 mg/l.

6. A method according to claim 3, **characterised in that** the treatment of the ion exchanger occurs with copper-free zinc sulphate solution, which has a pH of at least 2.

7. A method according to claim 3, **characterised in that** the copper removal with ion exchanger occurs at a pH of over 3.5.

8. A method according to claim 7, **characterised in that** the copper removal with an ion exchanger occurs at a pH of 3.7 – 4.2.

9. A method according to claim 3, **characterised in that** the copper separation from the regeneration solution is carried out as sulphide precipitation.

10. A method according to claim 1, **characterised in that** the polymeric amine acting as the functional group of the ion exchanger or selective separation material is a polyethylene imine.

11. A method according to claim 1, **characterised in that** before copper removal with an ion exchanger at least some of the raw solution is routed to a chloride removal stage.

12. A method according to claim 11, **characterised in that** before chloride removal the raw solution is cooled to a temperature of maximum 45°C.

13. A method according to claim 11, **characterised in that** before chloride removal the pH of the raw solution is adjusted to the range of 1.5 – 3.9.

14. A method according to claim 11, **characterised in that** chloride removal is performed using copper (I) oxide, cuprous oxide, so that the chloride in the solution is precipitated as copper chloride.

15. A method according to claim 14, **characterised in that** copper chloride is separated from the solution and converted with alkali back to cuprous oxide, which is at least partially routed back to chloride removal.

16. A method according to claim 11, **characterised in that** part of the raw solution is routed to cuprous oxide precipitation, where the copper in the solution is made to react with zinc powder to form cuprous oxide, and the Cu_20 generated is routed to the chloride removal stage.

17. A method according to claim 11, **characterised in that** the copper content of solution routed from the chloride removal stage to copper removal is in the range of 500 – 5000 mg/l.

18. A method for the removal of copper and chloride from a chloride-containing concentrated zinc sulphate solution, or raw solution, going to an electrolytic preparation of zinc, **characterised in that** at least some of the raw solution is routed to cooling, where the solution is cooled to a temperature of 30 – 45°C and the pH is adjusted to the range 1.5 – 3.9, after which the cooled solution is routed to chloride removal, which is performed with copper (I) oxide, Cu_20, whereby the chloride in the solution is precipitated as copper chloride; the copper chloride is separated from the solution and the solution is routed at least partially to copper removal, which occurs using a silica-based ion exchanger or other selective solids separation material, of which a polymeric amine acts as a functional group, and where the ion exchange step comprises an alkaline pretreatment of the ion exchanger, treatment with copper-free zinc sulphate solution, copper

removal, a regeneration of the ion exchanger and a separation of copper from the regeneration solution; the solution from which chloride and copper have been removed is routed to the following stage of solution purification.

19. A method according to claim 18, **characterised in that** the copper chloride is separated from the solution and converted using an alkali back to cuprous oxide, which is at least partially routed back to chloride removal.

20. A method according to claim 18, **characterised in that** some of the raw solution is routed to cuprous oxide precipitation, where the copper in the solution is made to react with zinc powder to form cuprous oxide, and the Cu_20 generated is routed to the chloride removal stage.

21. A method according to claim 18, **characterised in that** the ion exchanger or selective separation material is chelating and has an alkyl-silylated silica base.

22. A method according to claim 18, **characterised in that** the zinc content of the raw solution is in the range of 30 - 200 g/l.

23. A method according to claim 18, **characterised in that** the copper content of the solution routed to copper removal is in the range of 500 – 5000 mg/l.

24. A method according to claim 18, **characterised in that** the treatment of the ion exchanger occurs with copper-free zinc sulphate solution, which has a pH of at least 2.

25. A method according to claim 18, **characterised in that** the copper removal with an ion exchanger occurs at a pH value of over 3.5.

26. A method according to claim 25, **characterised in that** the copper removal with an ion exchanger occurs at a pH value of 3.7 – 4.2.

27. A method according to claim 18, **characterised in that** the copper separation from the regeneration solution is carried out as sulphide precipitation.

28. A method according to claim 18, **characterised in that** the polymeric amine acting as the functional group of the ion exchanger or selective separation material is a polyethylene imine.